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## THE SOCIAL ASPECTS OF REPRODUCTIVE BEHAVIOR IN THE PINTAIL

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The social behavior of the Pintail, *Anas acuta*, seems to diverge most noticeably from that of other North American ducks of the genus *Anas* during the nesting phase of the reproductive cycle. This study examines the reproductive cycle of the Pintail with particular emphasis on the motivation and function of aerial activity which can be observed throughout the nesting season. Aerial activity during pair formation and nesting in ducks has been discussed by H. Ahlbaum (1944), Sowls (1955), Dzulin (1955, 1957), Lebreton (1961), Wils (1960), Hori (1963), and McKinney (1965). Nonreproductive activity among young Pintails was observed to serve as a basis for comparison with reproductive behavior.

### CALLS AND POSTURES OF YOUNG PINTAILS

Eggs from wild Pintails were collected by members of the staff of the Delta Waterfowl Research Station near Delta, Manitoba. In the spring of 1958 and artificially incubated in the station hatchery. Approximately 100 of the resulting young Pintails were observed in captivity from 1 August 1958 to 31 October 1958 when they were from 7 to 25 weeks of age. The birds were not plucked or feather-clipped and flight activity in the enclosure was a normal daily activity. Disputes resulting from crowding were a common occurrence among young captive Pintails, and six behavioral responses were studied. These were pecking, retreating, three postures, and a display that is called chin lifting (Von de Wall, 1963). Von de Wall does not suggest that this display of the Pintail is identical to chin lifting in other ducks, but he believes that it corresponds to chin lifting.

Posture I (Figure 1) has the appearance of a pecking intention movement, and its close association with pecking in action sequences suggests that it has this derivation. Posture III (Figure 1) is most frequently associated with escape behavior and its form suggests this tendency, for the head is drawn back as if to avoid contact with other individuals. Posture II (Figure 1) appears intermediate between I and III. Chin lifting (Figure 1) is closely linked with posture II and exhibits a similar characteristic in that neither attack nor escape predominate in sequences in which it occurs. The form of chin lifting suggests a movement component other than intention of pecking or retreating.

Males 7- to 16-weeks old have vocalizations that are slightly modified from the calls of downy young. The *peep* sound given by the duckling becomes *whee* or sometimes *kwee*. Like the *peep* note, *whee* is given

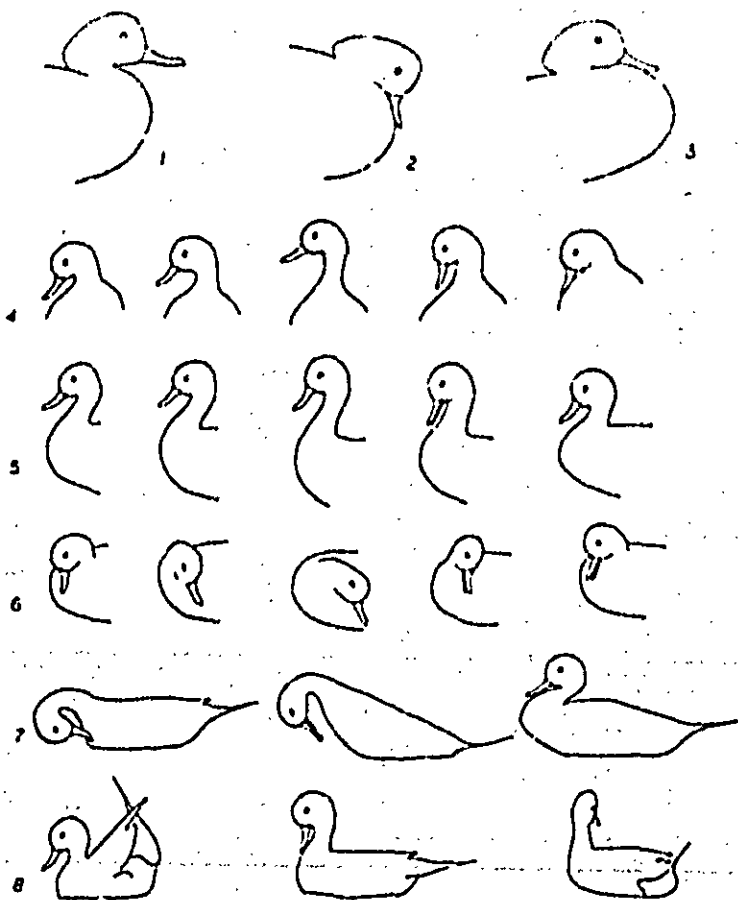


Figure 1. Pintail displays when standing or swimming. Key: 1, posture I; 2, posture II; 3, posture III; 4, chin lifting; 5, burp; 6, inclining; 7, grunt whistle; 8, head up; tail up.

singly or in series. At 18 to 20 weeks a whistle develops in addition to the *whcc*. The appearance of the whistle coincides with the first sexual behavior oriented to females.

Young females at 7 weeks of age are capable of sounds that have the tonal quality of adult calls. The *peep* note of the duckling becomes *kuk*. This note, given singly or in series, corresponds to the *whcc* of the male. In addition to the *kuk*, young females give a rapid sequence of highly pitched notes, somewhat like *kc-kc-kc-kc-kc*, but perhaps better described as a squeal. This call was not heard among sexually mature Pintail hens.

Calls occur with postures I, II, and III and to some extent with chin

lifting. They are not closely associated with pecking or retreating. Young males give *wher* calls from all three postures, but females give *kuk* calls from postures I and II and usually give the squeal while holding posture III. Males over 20 weeks old often give a whistle while holding posture III and use the *wher* call with postures I and II, suggesting a possible homology between the squeal of young females and the whistle of mature males.

#### PAIR FORMATION

I was able to study Pintail pair formation on the coastal bays and lakes near Rockport, Texas, from 1 December 1958 to 15 February 1959. The species is present along this portion of the Texas coast from September through mid-March. Further studies were conducted at Delta, Manitoba, in the spring of 1959. The Delta marsh and the surrounding farmland have been described by Hochbaum (1944), Sows (1955), and Milonski (1958). Young Pintails were held overwinter at the Delta Research Station hatchery until 27 March 1959. At that time 60 were marked individually with plastic leg bands, using various color combinations, and released. These individuals and a few unmarked wild Pintails that I had in the vicinity were observed until 15 July 1959.

Pintail courtship can involve one or several males and a female, and the participation of several males is the most conspicuous aspect of the activity. Courtship can occur on land, water, or during flight. It was observed most frequently between mid-December and the first week of April. Courtship occurred among captive young Pintails at Delta in September and October. Fall pairing in wild flocks was not observed, and I think it is not a common occurrence because the sexes tend to flock separately in the fall.

In early December of 1958 the Pintail population near Rockport, Texas was composed of large flocks of drakes and smaller flocks of hens. A few females were present in the male flocks. In mid-December the sexes began to form mixed flocks that averaged 70 per cent males.

An excess of drakes is usually present in a Pintail population. Situations involving one drake and a hen cannot be considered more typical of courtship than the participation of several drakes, but a drake and a hen represent the basic stimulus-response situation. Both sexes use several movements associated with care and maintenance of the body in the one male and female pair formation situation. Those occurring most frequently are bill dip and head shake, preening the upper breast, preening the under surface, head rolling, nibble preening the scapulars and back, preening behind the wing, tail shake, drinking, and feeding.

In addition to body care movements the male performs two displays, and one of these, chin lifting, has been discussed. The other movement,

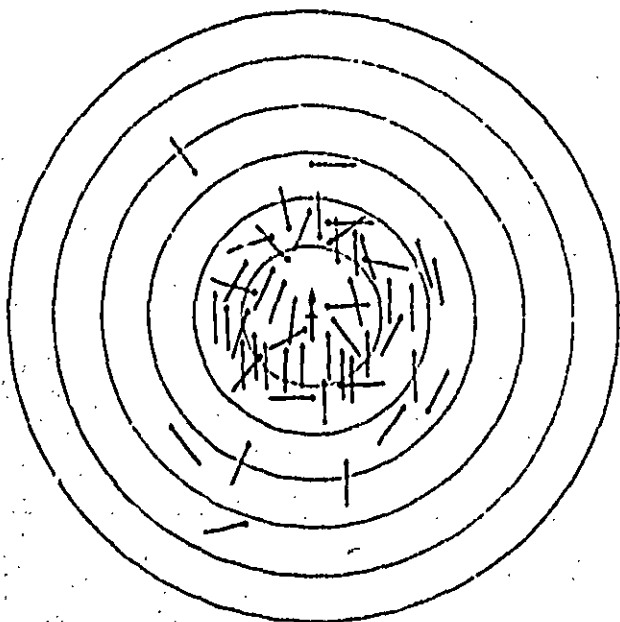


Figure 2. Position of male (light arrows) in relation to female (center arrow) when burp is performed. Distance between rings represents 1 foot.

the burp (Figure 1) described by Lorenz (1953), involves raising the head slowly, then tilting the bill downward, and then lowering the head. *Whee* is given with a rising inflection as the head is lowered. A whistle occurs simultaneously with the *whee* note as the bill is tilted after the head is raised. Distortion of the upper neck region is apparently necessary to produce the whistle. Chin lifting and burp head movements, though not identical, are similar. Both displays are often performed in the same action sequence: first one is given and then the other, each occurring several times during a brief interval. A form intermediate between the two displays occurs occasionally. In a few cases burp intergrades with still another display called bridling to be discussed under copulatory behavior. The burp is usually given as the male's body is oriented in a manner that suggests preparation to mount the female. The closer the male is to the female, the more evident this orientation becomes (Figure 2). The whistle component of the burp is a call that attracts other Pintails which subsequently join in pair formation activity. Later in the breeding cycle a male temporarily separated from his mate will perform the burp while searching for her.

When several drakes compete for a hen, she selects one of them, usually

a male that established his relationship with her prior to the approach of other males. Otherwise the female selects a male within a matter of minutes or even seconds, and during group activity a competing male must win the female's favor by replacing the selected male.

With the exception of a few body care movements, displays used during group activity differ according to the sex of the individual and the male-female relationship. The female's role in a courting group is relatively simple; during group courtship she usually performs only one display, inclining (Lorenz, 1953). This display occurs on land or water. It is initiated as she moves to or follows the preferred drake. From this position she performs head and neck movements directed at males that approach her. These movements are normally oriented to the side or rear and repeated in a rhythmic manner (Figure 1). The pattern is variable, for the movements can be initiated from posture I, II, or III and occasionally from an alert position in which the head is held high.

A vocalization accompanies inclining and consists of *kuks* which follow each head movement to the side. This call is similar to the squeal of sexually immature females, but the individual notes are pitched lower. It can be described as *kuk-kuk-kuk-kuk-kuk . . . kuk-kuk-kuk-kuk*. In form the call falls somewhere between a squeal and the *kuks* associated with postures I, II, and III in nonsexual situations. The inclining call attracts males that show sexual interest upon approaching. When all aspects of this display are considered, it apparently functions in several ways to attract and space the individuals of a courting group.

During group courtship the female remains with her male as long as he is able to retain his position. If he is forced from this position she sometimes resorts to flight. Prior to flying she usually assumes the alert posture and the group becomes synchronized for flight activity. Courtship flights occur in January and February but are most frequent in March and April. They seem to occur more often among Pintails than Mallards, *Anas platyrhynchos*. The female controls the flight direction but not the positions of the individuals involved. Drakes move to the hen and away from her, which results in constant shifting of position; the preferred drake is often difficult to detect. The hen occasionally indicates her preference by shifting in his direction. During courtship flights females perform aerial versions of postures I, II, and III (Figure 3). The previously described *kuk* calls associated with these postures also occur.

Females occasionally use an additional movement, not previously described, during courtship flights. This display, which I term the female's head up display (Figure 3), seems to have no counterpart during courtship on land or water. She performs the movement by raising her head upward slightly above the horizontal axis of the body while keeping the

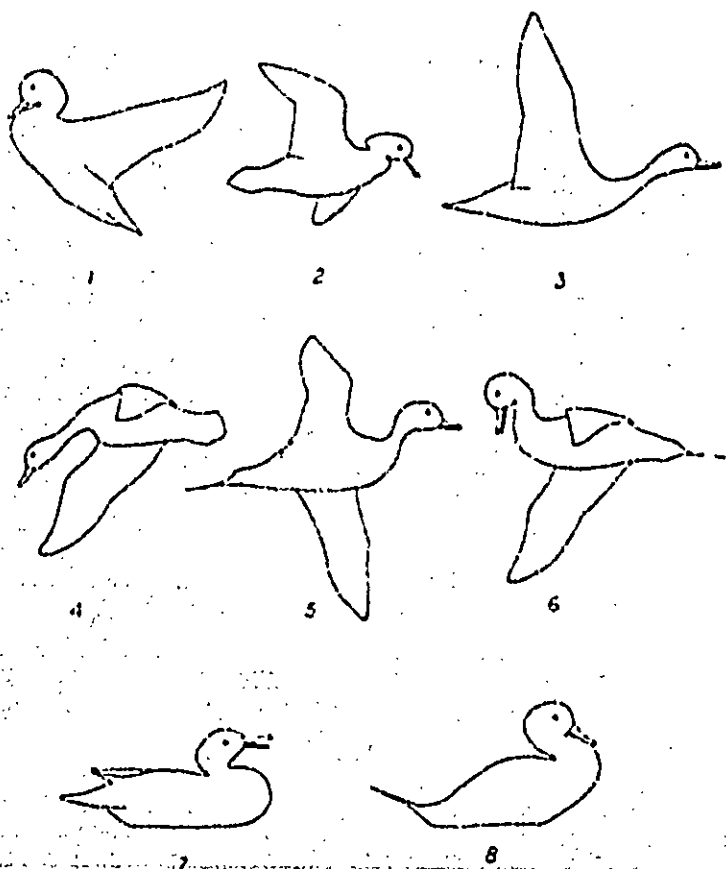


Figure 3. Six aerial displays of the Pintail, repulsion, and bridling. Key: 1, posture II; 2, posture I; 3, head up; 4, head down; 5, turning the back of the head; 6, burp; 7, repulsion; 8, bridling.

neck outstretched. No vocalization takes place during the display, which occurs during aerial courtship activity but is more common during the flight activity associated with nesting.

Action sequences performed by males in a courting group vary depending upon relationship to the female. The preferred male usually chin lifts and burps more frequently than other males. He also leaves his hen occasionally to peck at a male that attempts to take his position. The most common displays performed by the preferred male are burp and turning the back of the head (Lorenz, 1953). The aerial forms of these displays are shown in Figure 3. On water or land turning the back of

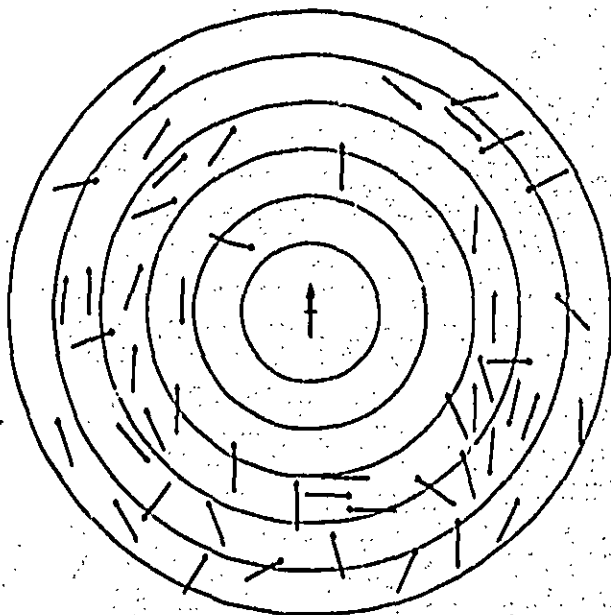


Figure 4. Position of male (light arrows) in relation to female (center arrow) when grunt whistle is performed. Distance between rings represents 1 foot.

the head is closely associated with the female's inciting. The male holds his head erect as he moves away from the female and turns it from side to side as he appears to look back. A streak of brown feathers on the back of the neck is erected and stands in contrast to the white on the sides of the neck. When the preferred male performs turning the back of the head, the female often responds by following and inciting.

Burp and turning the back of the head are also used by competing males, but the grunt whistle and head up tail up occur more frequently among these males (Figure 1). Both displays have relatively complex movement and vocal components, and they have been discussed as Mallard displays by Lorenz (1953), Weidmann (1956), and Johnsgard (1960). Figure 4 illustrates the male's body orientation to the female during the performance of the grunt whistle. Distance from the female is greater than for the burp (Figure 2), and the lateral orientation is not so pronounced as that of the burp.

Nod swimming, a common display during Mallard courtship, is given occasionally by Pintail drakes. The Pintail has an abbreviated form of this pattern, and I failed to detect it during most of the observations. Pintail nod swimming consists of short thrusts of the head forward and



back as the male swims through the courting group. On one 100-foot roll of 16-mm film checked for nod swimming, it occurred five times among a total of 75 other displays. If this frequency is typical, I have overlooked a display of some importance.

Courting groups are usually organized around a paired female, and I could detect no display of the female Pintail that might signal sexual intent without indicating preference for a particular male at the same time.

#### MATE DEFENSE AND COPULATION

In March and April males become more aggressive, particularly in the vicinity of their mates. Other Pintails approaching within 10 to 15 feet will usually be chased beyond this radius, but females are occasionally accepted. The paired female often chases an intruding female away if her mate fails to react aggressively. If the male fails to respond to an approaching male, the female begins the inciting performance and courtship behavior occurs. With the exception of activities that require close flocking, such as migration, repeated acts of aggression by a male near his female mark the end of group courtship.

No copulation attempts were noted during January or February. I was unable to establish just when this activity first occurs. Copulation attempts between members of a pair are associated with mate defense, and both were observed most frequently shortly after arrival on the breeding grounds. Pintails arrived on the Manitoba study area during the first week of April.

Copulatory behavior was not observed frequently among Pintails during this study. Only 14 copulation sequences involving both members of a mated pair were recorded that were observed from beginning to end and were completed to the extent that the male mounted his mate; 8 of these appeared to result in cloacal contact.

Copulation takes place on the water. The female indicates her intention to copulate by assuming a prone position. The male responds by giving a display which Lorenz (1953) calls precopulatory pumping. As the male moves to the female, he raises his head and then lowers it repeatedly in a rhythmic manner. As the male mounts the female, he grasps the feathers of the back of her head with his bill. The female then elevates and turns her tail to the side as cloacal contact is made. The male may continue to hold the female's head momentarily or release it as the pair breaks apart. At this point the behavior becomes more variable. Following copulation males performed the courtship displays, burp and turning the back of the head.

The most frequent movement after copulation was bridling, a postcopulatory display characteristic of the genus *Anas*. Bridling is performed by the

male as he prepares to move from the female's back. He draws his head back so that his bill is high on his breast (Figure 3), and if he has not released the female's head, he pulls it upward and backward by the movement. As the male pulls his head back, he whistles.

#### THE NESTING SEASON

Activities associated with nesting were studied at the Louisiana Lakes near Brooks, Alberta, in 1956 and 1957. Pintails arrived at this latitude by the first week of April both years, and nesting activities ended in July. Waterfowl habitat in this part of Alberta consists of shallow ponds which are often of a temporary nature. These ponds or potholes contain no large emergent aquatics, and the surrounding vegetation is grazed short grasses that provide sparse nesting cover. The Pintail is the commonest duck in this habitat. Though drought conditions prevailed on the study area in 1956 and 1957, a series of impoundments created by "Ducks Unlimited" contained permanent water and provided breeding habitat for Pintails throughout the nesting period. For a detailed discussion of waterfowl habitat in this part of Alberta see Keith (1961). Further observations were made at Delta, Manitoba, on 60 hand-reared Pintails that were marked and released at the Delta Waterfowl Research Station 27 March 1959.

Exploratory flights, pursuit flights, harassment, and broody behavior are four types of social behavior associated with the nesting period. Pairs made exploratory flights (nuptial flights, Hochbaum, 1944) shortly after their arrival on a potential breeding ground. Flights occur in the morning or evening and are instigated by the hen. A pair flies up, leaves the flock, circles over surrounding habitat, and then returns to the flock. The pair may be joined by other Pintails, and a form of aerial courtship that involves several females and several males can develop. Exploratory flights were particularly common at Delta, Manitoba, and were seen occasionally in Alberta.

Pursuit flights are instigated by a paired female as she approaches or is approached by a male other than her mate. She responds to this male by flying up, and he in turn responds by following her closely. Her own mate is usually a participant in that he follows the other two at some distance. The form of the flight is not constant, but in all cases it is characterized by a male pursuing a female. I have never seen a Pintail pursuit in which one male chased another male, which I have occasionally noted among Mallards.

Pursuit flights may last a few seconds to an hour or more. The shorter versions usually proceed several hundred yards from the starting point and end as the pursuing male moves away from the female and her mate returns to a position at her side. Either the pair or the pursuing male may return to the starting point; occasionally none or all three of the partici-

pants may return. The pattern may be repeated many times until either the pursuing male or the pair change location, or all three birds settle where they started and engage in some other activity.

Longer flights often continue several miles from the point of origin. Additional drakes may join the group and take an active part or become followers and trail behind. The size of the group fluctuates as individuals join for a while and then drop out. During the flight the pursuing male usually approaches the female from the rear and below. As he moves upward and closer he may touch or grab at her flank or breast feathers with his bill. She responds by rising upward, hesitating momentarily, then changing course to the right or left. After this maneuver the male passes beyond her, returns, and flies upward to intercept her and repeat the performance. Flights often climb into the sky until birds directly overhead cannot be seen without the aid of binoculars.

The female assumes the head up frequently during the chase, usually intermittently with aerial postures I, II, and III (Figure 3). Longer flights are ended by the female descending rapidly from a great height and often landing on high ground some distance from water. The pursuing male or males follow close behind and the activity continues on the ground. The intentions of the pursuing male become more evident as he runs after the female and attempts to mount and copulate. The female may continue to avoid his advances or submit to them. If the female continues to give the head up display intermittently throughout the chase, it has been my impression that a promiscuous copulation will occur eventually, if not involving the original pursuer then another male that replaces him. The copulation normally occurs out of water. After the pursuing drake performs the initial copulation, other drakes in the group will occasionally mount and copulate. I have never seen the hen's mate take part in this type of copulatory activity; he generally stands at the edge of the group in an alert position. This type of copulation is not preceded or followed by copulatory displays. After copulation the pursuing male often stands alert for a few minutes, then flies away. The group disperses, and the hen and her mate are frequently the last to leave.

Freezing temperatures in mid-April on the Alberta study area in 1956 caused a temporary decline in the frequency of pursuit flights and a delay in nesting activity. Rapidly declining water levels can also cause a temporary decline in activity by forcing a flock to move to another location, as I noted along the White Mud River near Langruth, Manitoba, in 1959.

Figure 5 graphs a composite of the aerial pursuits recorded for 10 marked hens at Delta in 1959. The pursuits observed were plotted by 4-day intervals in relation to the first day of incubation, and the onset of

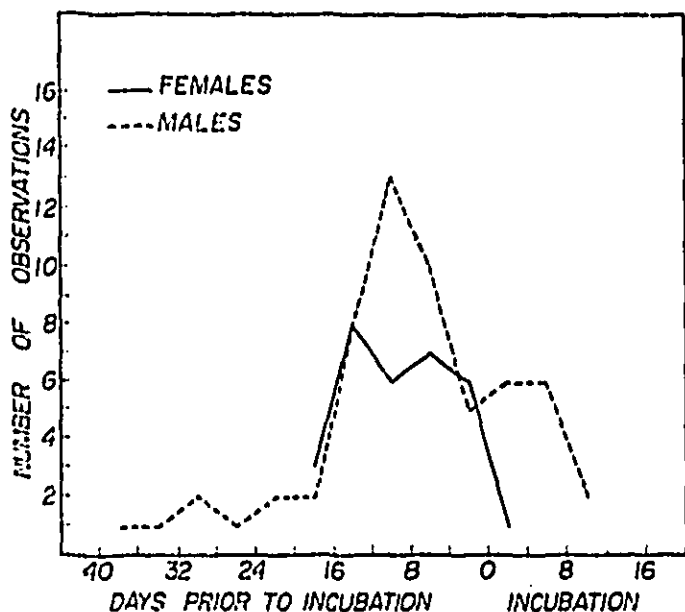


Figure 5. Frequency of pursuit flights by marked Pintails at 4-day intervals in relation to the first day of incubation.

incubation was determined within a 48-hour period. Pursuits associated with both first and second nesting attempts are used in four cases; other data concern the first nesting attempts of six pairs. As clutch sizes of the hens varied from six to eight eggs, a period of about 8 days prior to the first day of incubation can be considered as the egg-laying period. Figure 5 shows that the hens participated in aerial pursuit activity about 12 days before laying the first egg, and pursuits continued until egg-laying was complete.

The pursuit activity of the drakes mated to the hens (discussed above) is also plotted in Figure 5. They engaged in pursuit activity over a much longer period of time, but their period of greatest frequency corresponds to that of their mates. Drakes were most active in chasing other hens during the period in which their own mates were being chased.

At Delta in 1959 unmarked males paired with several of the marked females, producing a surplus of six marked males. Table 1 compares the behavior of these males to paired males in situations that could have resulted in pursuit activity. It is evident that unmated drakes were less inclined to engage in pursuit activity than mated males. They are more inclined to perform other activities in potential pursuit situations, most frequently displays associated with pair formation. Pursuit flights are

TABLE 1  
COMPARISON OF THE BEHAVIOR OF PAIRED AND UNPAIRED MALES IN POTENTIAL  
PURSUIT FLIGHT SITUATIONS

Activity performed	Frequency of observation	
	Paired male	Unpaired male
Does nothing, body care activity, or moves away	31	75
Courtship display	39	92
Harasses or chases the female	146	42
Total observations	216	209

usually the result of an interaction between a paired male and female that are not mates.

Harassment occurs when a male with sexual intentions approaches a female that is not willing to participate in pursuit activity. He walks or swims toward her without hesitation and without performing a display. If he reaches her he grabs at the back of her head and attempts to mount and copulate. The female responds by swimming or running away. The flights that occur in this situation are typically short, and if the female is reluctant to leave the area, she will make repeated short flights of about 10 to 30 yards. The male will eventually become discouraged or his continued efforts will force the female to leave. A female that has come to an area to feed, for example, will tolerate harassment for a remarkably long period. If concealing cover such as cattails or phragmites is close by, she often avoids the male by moving into it. As all gradations between harassment and pursuit behavior took place among hens with destroyed nests, it was difficult to establish just what motivation prevailed when an unmarked female did not appear receptive to a male at first but eventually became so.

Broody hens were most frequently involved in harassment activity. The term broody describes the physiological and psychological state of a female that is incubating eggs or caring for young. A hen with eggs or young can be identified as such by her broody behavior. Evidence of broodiness was detected in marked hens for as long as 2 weeks following nest destruction. Broody behavior occurs for the first time at the beginning of incubation. The repulsion display, called gestures of repulsion by Lorenz (1953), was performed only by broody females. It is given in harassment situations and sometimes in response to a human approaching.

Repulsion involves a head and neck position that closely resembles posture III and in some cases postures I and II. The bird gives a series of

calls, *kak-kak-kak-kak*, jerking the bill upward slightly at each note (Figure 3). This call does not occur during any other phase of the life cycle; it can be distinguished from incliting by its tone and by the more deliberate manner in which each note is given. When repulsion is performed on the ground the breast is sometimes held very low, touching the ground occasionally. The preening movement, head rolling, is closely associated with repulsion during harassment.

Broody females also give a second group of vocalizations during harassment and in response to a human approaching the brood. They occur with postures I, II, and III and often alternate or intergrade with the repulsion call. I refer to them as the broody calls and they correspond to the pattern described by Sowers (1955) as "teasing." A word description is difficult, but the calls vary as *gaak* or *gaauk* . . . *kak* or *gaauk* . . . *keek-keek*, sometimes softly as *kee-kee*.

In addition to aerial forms of postures I, II, and III, broody females use a flight posture that I have called the head down (Figure 3). At first I thought it might be a simple intention movement to land, for the head is held very low in relation to the horizontal axis of the body. I now suspect the pattern represents an aerial display associated with harassment. Its form, signal, and motivation are probably the opposite of head up.

The interpretation of repulsion and the broody calls is difficult, for broody females use both in approximately the same situations. Harassment situations can be divided into two types, those in which no flights occur and those in which repeated short and occasionally longer flights occur. Broody calls are associated with flight activity, and repulsion is given by hens that are very reluctant to fly.

Ten of the hand-reared Pintail hens and four of the hand-reared drakes were retained in the enclosure at Delta in the summer of 1959. One of these hens laid a clutch of eggs in a nesting basket in the enclosure and successfully hatched a brood. Shortly after hatching I removed the ducklings and placed them in an adjacent pen where they were visible to her but separated from her by wire mesh. When I walked into the pen containing the brood, she flew some distance away from the wire separating her from her brood and gave broody calls; then as she walked back toward the wire, approaching both me and the brood, she began giving repulsion calls.

In Alberta I walked toward hens with broods on several occasions; in each case the hen made short flights and gave broody calls while the broods crouched and remained motionless. I never saw a wild hen with a brood react to my approach with a repulsion display.

To examine the behavior between first and second nesting attempts, the eggs of six marked hens were taken at stages of incubation varying

from 4 to 20 days. The interval between nest robbing and second laying varied from 6 to 10 days in four cases. One hen whose eggs were taken on the 20th day of incubation did not begin incubating a second clutch until 29 days later. Another hen whose eggs were also removed on the 20th day of incubation was found freshly dead 13 days later; autopsy showed her ready to lay the first egg of her second clutch. Hemorrhages within the skull cavity and in the neck suggested she was killed by males hammering her about the head.

Five of the hens remained with their original mates, the sixth acquired a new mate the day her eggs were taken. No group courtship was seen during the formation of this pair bond. Observations on other hens that acquired new mates during the nesting season showed that, while group courtship occurred occasionally throughout the nesting season, it was not necessarily associated with the formation of new bonds.

Harassment increased on the day the eggs were taken, probably a result of the sudden increase in availability of females. The first pursuit flight was observed 6 days after one nest was destroyed, and its hen laid her first egg that day. Eight pursuit flights involving these females were watched, five of them during the egg-laying period or less than 2 days before it. No copulation between mates or in connection with pursuit flights was noted for any of the six hens in this experiment. The results of the renest study support the conclusion that pursuit flights are associated with egg-laying. Broodiness and a higher frequency of harassment were characteristic of the period immediately following nest robbing.

A primary purpose of this study was to explain the function of pursuit flights of the Pintail. In 1944 Hochbaum described pursuit flights of surface-feeding ducks and discussed this behavior as a form of territory defense. He made the following statements regarding the function of the breeding territory of ducks:

Thus, when a male female, by her actions, expresses her desire to copulate, she offers herself not only to her mate, but to the world of drakes at large. An action demands a response. In the isolation of territory, only her drake responds; in a social gathering, all males that are sexually active and ready for copulation respond (p. 86).

The same is seen in captivity, particularly in the Mallard and Pintail. In pens, successful copulation frequently is prevented when a pair is held in close company with sexually active drakes of the same species. Or, in such close association, monogamy completely breaks down, and the hen is served indiscriminately by the nearest or strongest drake (p. 87).

I believe, then, that the primary function of territorial defense behavior in ducks is to establish isolation from sexually active birds of the same species during the copulation link of the reproductive cycle (p. 87).

The above conclusions seem reasonable when applied to most duck species, but behavior that establishes isolation from sexually active birds

of the same species during the copulation period must exclude sexually active males. During the egg-laying period, Pintail drakes rarely behave aggressively to each other. A male will often seek out females to chase or other males to loaf and feed with while his hen is at the nest site. When a Pintail drake approaches or is approached by a pair, he may or may not pursue the female of this pair, depending upon her response to him, but in either case, he is rarely prevented from doing so by the hen's mate.

If we assume that the value of dispersal of pairs lies in the resulting distribution of nests, the Pintail's pursuit flight can be considered as behavior that tends to place females some distance from other females at the time eggs are laid. Though the motivation of the pursuit flight is primarily sexual, in many situations it must also influence the distribution of nests by spacing them farther apart than they would be otherwise.

The pursuit flight occurs during the nesting season, and the greatest frequency of this activity coincides with egg laying. This flight often terminates in promiscuous copulation. These flights probably function to disperse females, but the possibility that promiscuous copulations occurring in conjunction with pursuits are important in the fertilization process seems equally significant. Throughout the study a low frequency of copulation attempts between the members of a pair was manifest.

#### SUMMARY

Pintails tend to form unisexual flocks in the fall. Pair formation begins during the winter as flocks of males and females merge. The role of courtship groups in mate selection is difficult to determine, because this group activity is organized around a hen that has already indicated preference for a particular drake.

The Pintail seems well adapted to breeding habitat with sparse vegetation and temporary water. Flocks of Pintails arrive on the prairie shortly after the ice breaks and the birds respond quickly to suitable nesting conditions. Behavior that tends to disperse the flock functions more effectively than territorial behavior in the traditional sense. Pursuit flights may disperse females during the laying period, but the degree to which pairs are dispersed must vary depending upon the situation. Males rarely behave aggressively toward each other during the nesting season. This is probably related to promiscuity, but it also results in more flexibility in the distribution of nesting pairs.

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